

**REMARKS**

In the last Office Action, the Examiner objected to the drawings under 37 C.F.R. § 1.83(a). The Examiner rejected claims 1, 5, 21-22, and 24-25 under 35 U.S.C. § 112, paragraph 2 as indefinite. The Examiner rejected claims 1, 5, 21-22, and 24-25 under 35 U.S.C. § 112, paragraph 1 as containing subject matter not described in the specification in such a way to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention. The Examiner rejected claims 1, 5, and 21 under 35 U.S.C. § 102(b) as anticipated by Japanese KOKAI publication number 3-13576 ("*Isaka*"). The Examiner rejected claims 22 and 24-25 under 35 U.S.C. § 103(a) as unpatentable over *Isaka*. Applicants propose canceling claim 24 by this amendment and consider the Examiner's objections to and rejections of claim 24 moot.

**Amendment**

Applicants have amended claims 1, 5, 22, and 25. Applicants have amended claim 5 to clarify that it is an independent claim. Amendments to claims 1, 5, 22, and 25 are identified in the listing of claims above, with insertions indicated by underlining and deletions indicated by strikethrough lining. Applicants have also canceled claims 9-20, previously withdrawn in response to a restriction requirement, and canceled claim 24. Claims 1, 5, 21, 22, and 25 are currently pending. Applicants have also added new claims 26-28. Applicants respectfully request examination of claims 1, 5, 21, 22, and 25-28.

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**Formal Drawings**

Applicants respectfully request review of the formal drawings submitted as part of the application filed April 27, 2002. The Office Action dated January 16, 2002 (Paper No. 6), included an attachment indicating the drawings have not been reviewed because, "The drawings submitted with this application were declared informal by the applicant." However, the record contains no such declaration. The cover sheet filed with the original application clearly indicates under item number 3: "Drawings - 5 sheets of formal drawings containing 12 figures." **To date, there has been no indication that the Formal Drawings have been reviewed by the Examiner.** Review of the formal drawings is requested.

**Objection to drawings**

In the last Office Action, the Examiner objected to the drawings under Rule 83(a). According to the Examiner, "The drawings must show every feature of the invention specified in the claims. Therefore, the arc in conjunction with the filament, and means for introducing the vapor generated in the oven into the chamber almost perpendicularly to the arc as recited in claim 22; and the particles having shape and size of the ion source material as recited in claims 24-25 must be shown or the feature(s) canceled from the claim(s)." (Paper No. 19, at 2.)

Applicants have amended claim 22 to delete "to form an arc in conjunction with said filament" and "almost perpendicularly to said arc." Applicants believe this addresses the Examiner's objections to "the arc in conjunction with the filament," and "means for introducing the vapor generated in the oven into the chamber almost perpendicularly to the arc as recited in claim 22."

Regarding the Examiner's objection that "the particles having shape and size of the ion source material as recited in claims 24-25 must be shown or the feature(s) canceled from the claim(s)," the patent statutes provide that, "[t]he applicant shall furnish a drawing *where necessary* for the understanding of the subject matter to be patented. *When the nature of such subject matter admits of illustration by a drawing* and the applicant has not furnished such a drawing, the Commissioner may require its submission . . . ." 35 U.S.C. § 113. The Regulations provide similar requirements. See 37 C.F.R. § 1.81(a) & (c). Applicants submit that the disclosure in the figures of "a particle size larger than 1 mm and not larger than 5 mm," as recited in claim 25 is not necessary for an understanding of the claim element and the claim can be generally understood without including it in the figure.

Applicants respectfully request withdrawal of the objection to the drawings.

Applicants note these statements and amendments are made without regard to any prior art reference and should not be construed as a disclaimer of any scope of subject matter to which Applicants are entitled either through the literal scope of the claims or by equivalents.

**Rejection under § 112, ¶ 2**

The Examiner rejected claims 1, 5, 21, 22, and 25 under § 112, paragraph 2 as indefinite.

According to the Examiner, "Claim 1 is indefinite for reciting the limitation 'heating an ion source ... indium iodide (InI)'. How is the ion source material heated to producing an ion beam current of not less than 2  $\mu$ A effective to generate vapor of the indium iodide (InI)?" (Paper No. 19, at 2.) Applicants respectfully traverse the rejection

of this claim. Claim 1 recites, "generating indium (In) ions by discharging said vapor, to produce an ion beam current of not less than 2 $\mu$ A." Applicants submit claim 1 is definite as written.

The Examiner identified no separate basis for rejecting claims 5 and 21 under § 112, paragraph 2. Applicants assume claim 5 is rejected for reciting language identical to the objected to language in claim 1. Applicants assume claim 21 is rejected because of its dependence from claim 1. Thus, Applicants assert claims 5 and 21 are definite as written for the same reason as claim 1.

Also according to the Examiner, "Claim 22 is indefinite for reciting the limitation 'to form an arc in conjunction with said filament'." (Paper No. 19, at 2.) Applicants respectfully traverse the rejection of this claim. Applicants have deleted "to form an arc in conjunction with said filament," from claim 22. Therefore, Applicants submit this claim is definite as written.

The Examiner identified no separate basis for rejecting claim 25 under § 112, paragraph 2. Applicants assume claim 25 is rejected because of its dependence from claim 22, and assert claim 25 is definite as written for the same reason as claim 22.

Applicants respectfully request withdrawal of this rejection of these claims.

Applicants note these statements are made without regard to any prior art reference and should not be construed as a disclaimer of any scope of subject matter to which Applicants are entitled either through the literal scope of the claims or by equivalents.

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**Rejection under § 112, ¶ 1**

The Examiner rejected claims 1, 5, 21, 22, and 25 under 35 U.S.C. § 112, paragraph 1 as containing subject matter not described in the specification in such a way to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse the rejection of these claims.

According to the Examiner,

The specification is completely silent for reciting the limitations 'to produce an ion beam current ... indium iodide (InI)' as recited in claim 1; 'to form an arc in conduction with said filament' as recited in claim 22; and 'a particle shape and a particle size ... not more than mm' as recited in claims 24-25. Therefore, the Examiner don't understand how is the ion beam current effective to generate vapor of indium iodide? What is the arc? And how is the arc that is formed in conjunction with the filament? Additional explanations are needed if applicant insists on including these features in the claims 1, 22, and 24-25 without the insertions of new matter.

(Paper No. 19, at 3.)

In an exemplary embodiment, the specification discloses that "[t]he vapor discharged from oven 27 is introduced into the arc chamber 21 through a second gas inlet (an oven nozzle) 29. The InI vapor supplied into the arc chamber 21 is ionized, and the ions are extracted through an ion extraction opening 28." (Specification at page 14, line 27–page 15, line 4.) This portion of the specification is an example of support in the specification for the claim phrase, "to produce an ion beam current of not less than 2  $\mu$ A," as recited in claim 1.

Applicants have deleted, "to form an arc in conjunction with said filament," from claim 22.

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Further, the specification supports the claim phrase, "a particle size larger than 1 mm and not larger than 5 mm," recited in claim 25. For example, the specification discloses at page 14 lines 24–26, "InI (indium iodide) having a particle size ranging from 2 to 5 mm supplied into an oven 27 is heated and InI vapor is generated." The specification further discloses, "it is preferable that the particle size of the InI supplied in the oven 27 is larger than the diameter (1 mm in the present embodiment) of the second gas inlet 29 communicating with the arc chamber 21." (Specification, page 15, lines 6–10.)

The specification clearly discloses and supports each recited claim element. Because each element is supported, Applicants respectfully request withdrawal of the rejection of these claims.

Applicants note these statements are made without regard to any prior art reference and should not be construed as a disclaimer of any scope of subject matter to which Applicants are entitled either through the literal scope of the claims or by equivalents.

**Rejection under § 102(b)**

The Examiner rejected claims 1, 5, and 21 under § 102(b) as anticipated by *Isaka*. To reject a claim as anticipated, each claim element must be disclosed in a single reference. (MPEP § 2131 (8<sup>th</sup> ed. Rev. 2003).) Because *Isaka* does not disclose each claim element, Applicants respectfully traverse the rejection of this claim.

Claim 1 recites:

A method of generating ions, comprising:

heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not

larger than 5 mm at a temperature of not lower than 275°C and not higher than 380°C to generate a vapor of said indium iodide (InI); and

generating indium (In) ions by discharging said vapor, to produce an ion beam current of not less than 2μA.

According to the Examiner:

Isaka (3-13576) discloses, in fig. 1, an apparatus and/or method for generating and irradiating ions. The apparatus includes a heater 2 for heating indium iodide (InI) 3 contained in a vessel 4 of a cylinder 1; and a filament 51 in a discharge chamber 5 for discharging a gasified indium iodide to producing indium and iodide ions. The InI is heated at the temperature of not lower than 300 °C and not higher than 500 °C to vaporize the InI. The vaporized InI is discharged by the filament 51 to generate indium (In) ions. The indium ions can be used as the ion source of an ion implantation device for implanting the indium (In) ions onto a substrate. The discharge chamber 5 has two gas inlets for an inert gas 54 and the vaporized InI a.

(Paper No. 19, at 4.) Without agreeing with the Examiner's characterization of *Isaka*, *Isaka* neither discloses nor does the Examiner allege *Isaka* discloses "an ion source material . . . having a particle size larger than 1 mm and not larger than 5 mm," as recited in claim 1. The particle size may provide benefits related to dissolving the source material. (See, e.g., specification at p.1 15, lines 6–16, p. 17, lines 8–13.) As an example of possible benefits, when the particle size is less than 1 mm, the ratio of the surface area to the volume of an InI particle is large, which may result in absorption of water vapor by InI particles and a hydrolysis reaction with water vapor to generate hydrogen iodide. Heating InI containing water vapor in the oven to a temperature greater than 250°C, the water vapor contained in the InI particle vaporizes, with the result that InI gas cannot be supplied in a constant amount. When the particles have sizes greater than 5 mm, they may melt nonuniformly during heating. Consequently, it

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may take longer stabilize the inner state of the oven. When the oven is heated to a higher temperature, the particles may be melted uniformly; but the InI particles easily react with gases within the oven such as oxygen, water vapor, and carbon dioxide. As a result, InI gas may not be obtained in a constant amount. Absent a disclosure of *each* claim element, *Isaka* cannot anticipate claim 1. Applicants submit claim 1 is allowable over *Isaka*.

Claim 5 recites each element of claim 1 and claim 21 depends from claim 1. Applicants assert claim 5 is allowable for the same reason given with respect to claim 1 and claim 21 is allowable at least because of its dependence from allowable claim 1. Withdrawal of the rejection of these claims is respectfully requested.

**Rejection under § 103(a)**

The Examiner rejected claims 22 and 25 under § 103(a) as unpatentable over *Isaka*. Because the Examiner fails to establish a *prima facie* basis for rejecting claims 22 and 25 under § 103(a), Applicants respectfully traverse the rejection of these claims.

To establish a *prima facie* case of obviousness under §103(a), each of three requirements must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine references or modify a reference. (See MPEP § 2143.) Second, a reasonable expectation of success must exist that the proposed modification will work for the intended purpose. (See *id.*) Moreover, both of these requirements must "be found in the prior art, not in applicant's disclosure." (*Id.*) Third, the reference or references, taken alone or in combination, must disclose or suggest every element recited in the claims. (See MPEP §2143.03.)



Claim 22 recites

A method of generating ions, comprising:

heating an ion source material composed of indium iodide (InI), provided in a tall and wide oven provided outside of an arc chamber, to generate a vapor of said indium iodide (InI); and

generating indium (In) ions by discharging said vapor in said arc chamber, wherein a filament is provided on one side surface of said arc chamber, and a reflecting counter electrode is provided on a second side surface of said arc chamber opposite to said one side surface, and a gas inlet for said vapor is provided on one face of the arc chamber, said one face being between said one and said second side surfaces and perpendicular thereto, and is configured to introduce said vapor generated in said oven into said chamber.

According to the Examiner:

Isaka (3-13576) discloses all the features as discussed above except the chamber having the filament provided on one side surface and a reflector counter electrode provided on a second side surface opposite to the one side surface, and the gas inlet provided on one face of the chamber which is between and perpendicularly the one and the second side surfaces for introducing the vapor into the chamber almost perpendicularly to the arc as recited in claim 22; and the particle of the ion source material having the shape and size not less than 1 mm and not more than 5 mm as recited in claims 24-25.

Using the chamber having the filament provided on one side surface and a reflector counter electrode provided on a second side surface opposite to the one side surface, or the gas inlet provided on the one face of the chamber which is between and perpendicularly the one and the second side surfaces for introducing the vapor into the chamber almost perpendicularly to the arc is considered to be obvious variation in design, since the chamber having the filament provided on one side surface and a reflector counter electrode provided on a second side surface opposite to the one side surface of the gas inlet provided on the once face of the chamber which is between and perpendicularly the one and the second side surfaces for introducing the vapor

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into the chamber also perpendicularly to the arc is well known in the art and in the ion source as disclosed in Murakoshi et al (10-188833), thus would have been obvious to one skilled in the art to use the chamber having the filament provided on one side surface and a reflector counter electrode provided on a second side surface opposite to the one side surface, or the gas inlet provided on the one face of the chamber which is between and perpendicularly the one and the second side surfaces for introducing the vapor into the chamber almost perpendicularly to the arc in the Isaka (3-13576) apparatus and/or method for generating an irradiating ions.

Applying the particle of the ion source material having the shape and size not less than 1 mm and not more then 5 mm is also considered to obvious variation in design, since the size and shape of an element is consisting varying means of the element, thus would have been obvious to one skilled in the art to use the article of the ion source material having the shape and size not less than 1 mm and not more then 5 mm in the Isaka (3-31576) apparatus and/or method for generating and irradiating ions as Isaka (3-34576) discloses using the particles or indium iodide 3.

(Paper No. 19, at 5-6.) That is, the Examiner acknowledges that *Isaka* fails to disclose "wherein a filament is provided on one side surface of said arc chamber, and a reflecting counter electrode is provided on a second side surface of said arc chamber opposite to said one side surface, and a gas inlet for said vapor is provided on one face of the arc chamber, said one face being between said one and said second side surfaces and perpendicular thereto, and is configured to introduce said vapor generated in said oven into said chamber," as recited in claim 22.

Without agreeing to the Examiner's characterization of *Isaka*, Applicants note the Examiner has provided no motivation to modify *Isaka*, as required for an obviousness rejection. At most, the Examiner alleges, it "would have been obvious to one skilled in the art to use the chamber [of *Murakoshi*] having the filament provided on one side

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surface and a reflector counter electrode provided on a second side surface opposite to the one side surface, or the gas inlet provided on the one face of the chamber which is between and perpendicularly the one and the second side surfaces for introducing the vapor into the chamber almost perpendicularly to the arc in the *Isaka* (3-13576) apparatus and/or method for generating an irradiating ions." But as specifically noted by the Manual of Patent Examining Procedure: "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." (MPEP § 2143.01.) The Examiner has simply identified no motivation to modify *Isaka*. Absent a motivation to modify the reference, there is no *prima facie* case that claim 22 is obvious in view of *Isaka*.

Further, "the proposed modification cannot change the principle of operation of a reference." (*Id.*) *Murakoshi* discloses an arc chamber 21 including a material plate 29, which provides the ion source material. (*Murakoshi*, abstract.) The Examiner provides no indication how *Isaka* could be modified according to *Murakoshi*, which include a material plate 29, to support an obviousness rejection of claim 22, which recites, "a gas inlet for said vapor is provided on one face of the arc chamber."

In addition, *Isaka* has no disclosure or suggestion of "a reflector counter electrode" as recited in claim 22. At most, *Isaka* discloses cathode 52, which at best could be alleged to correspond to element 2 in Figure 1 of the present application.

Because the Examiner fails to make a *prima facie* case for obviousness, Applicants submit claim 22 is allowable over *Isaka*. Withdrawal of the rejection of the claim is respectfully requested.

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Applicants further submit claim 25 is allowable at least because of its dependence from allowable claim 22.

Withdrawal of the rejection of these claims is respectfully requested.

**Claims 26–28**

Applicants submit new claims 26–28 are allowable at least because of the recitation of “said ion source material has a particle size larger than 1 mm and not larger than 5 mm,” and “a filament is provided on one side surface of said arc chamber, and a reflecting counter electrode is provided on the other side surface of said arc chamber opposite to said one side surface, and a gas inlet for said vapor is provided on one face of the arc chamber, said one face being between said one and the other side surfaces and perpendicular thereto, and is configured to introduce said vapor generated in said oven into said chamber,” which is similarly recited in allowable independent claims 1 and 22 above.

**Conclusion**

Applicants respectfully request that this Amendment under 37 C.F.R. § 1.116 be entered by the Examiner, placing claims 1, 5, 21, 22, and 25–28 in condition for allowance. This Amendment should allow for immediate action by the Examiner.

Applicants further submit that the entry of the amendment would place the application in better form for appeal, should the Examiner dispute the patentability of the pending claims.

In view of the foregoing remarks, Applicants submit that this claimed invention is neither anticipated nor rendered obvious in view of the references cited against this

AMENDMENT AFTER FINAL  
August 19, 2003

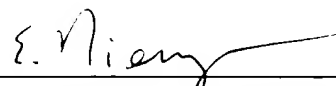
application. Applicants therefore request the entry of this Amendment, the Examiner's reconsideration of the application, and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: August 19, 2003

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